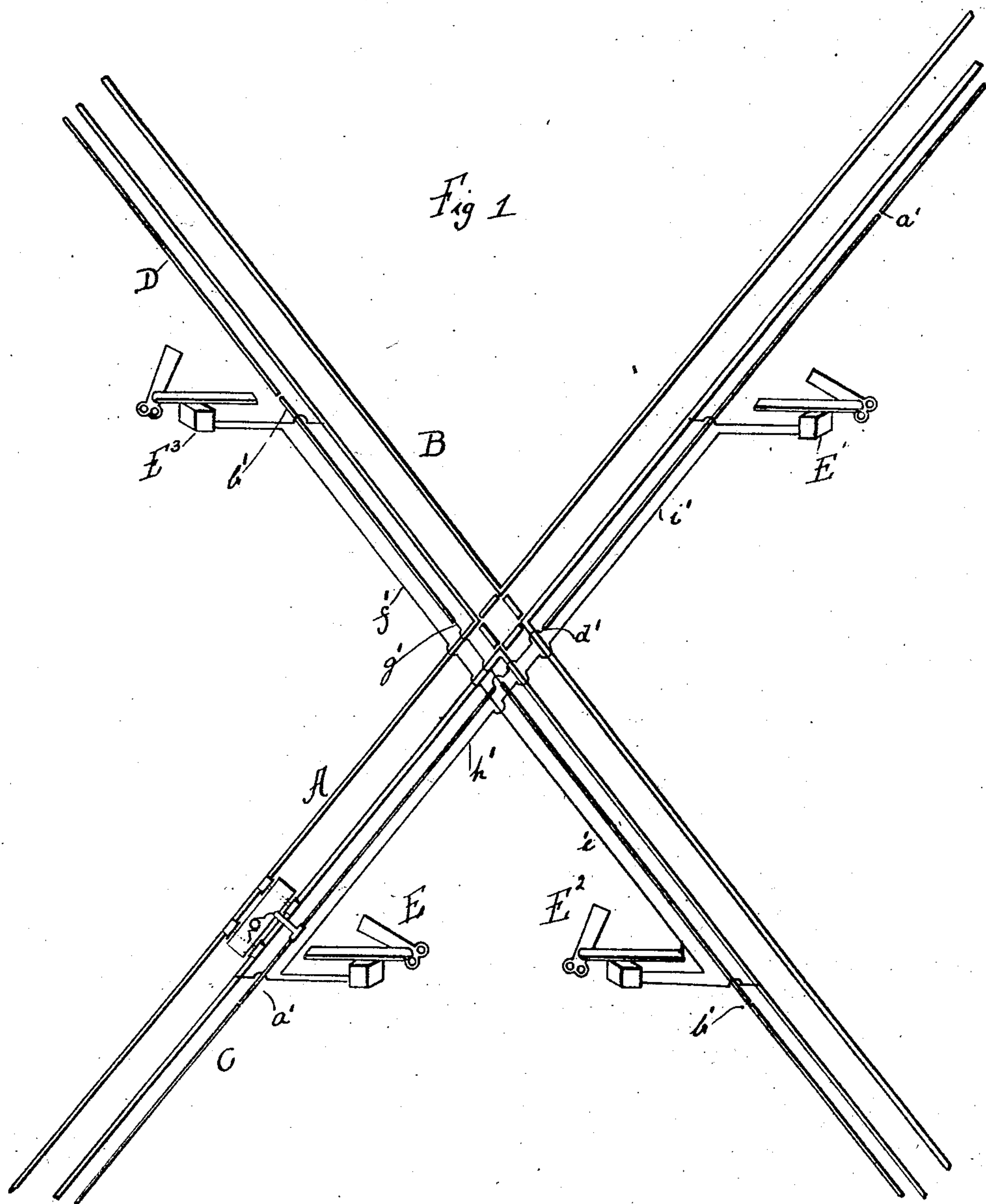


No. 886,847

PATENTED MAY 5, 1908.

J. P. NORWOOD.
AUTOMATIC RAILWAY SIGNAL.
APPLICATION FILED OCT. 5, 1906.

3 SHEETS—SHEET 1.



WITNESS:
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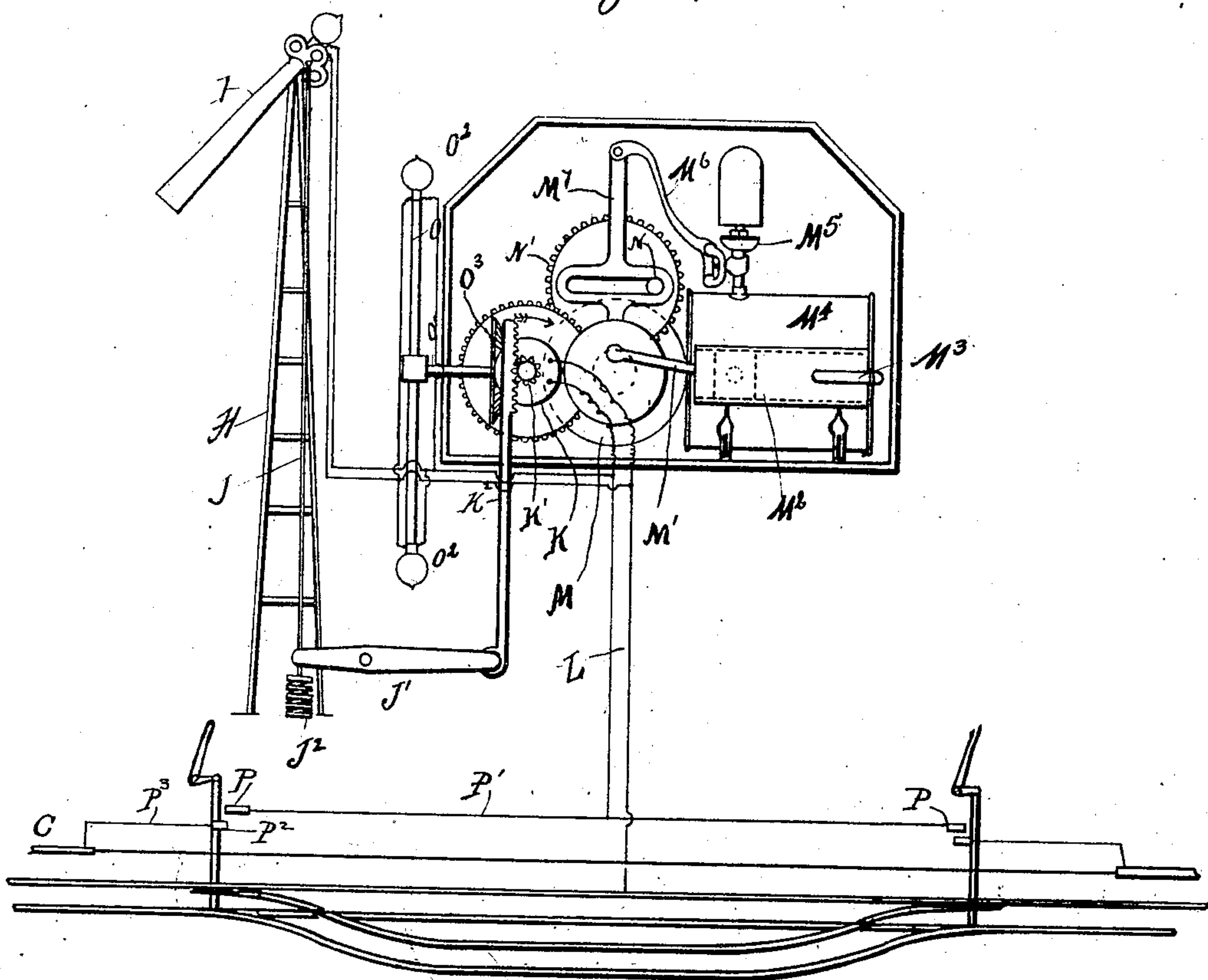
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3 SHEETS—SHEET 2.

Fig. 2.



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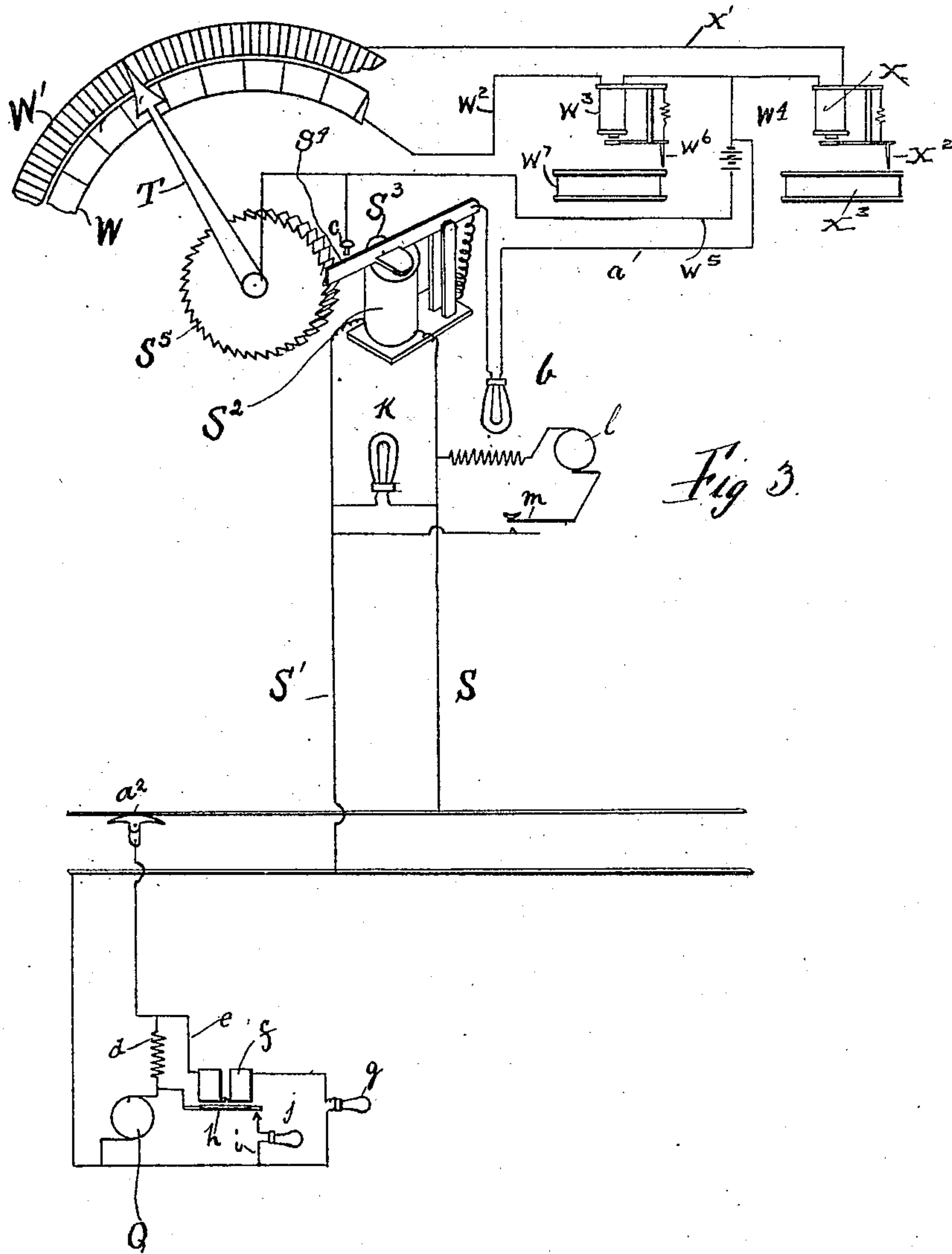
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3 SHEETS—SHEET 3



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AUTOMATIC RAILWAY-SIGNAL.

No. 886,847.

Specification of Letters Patent.

Patented May 5, 1908.

Application filed October 5, 1906. Serial No. 337,514.

To all whom it may concern:

Be it known that I, JAMES P. NORWOOD, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented a certain new and useful Improvement in Automatic Railway-Signals, of which the following is a specification.

My invention relates to a new and useful improvement in automatic railway signals, and has for its object to so construct and arrange mechanism and electric circuits as to provide for the signaling of trains at a crossing or other points along a railway and register either at a central station or upon each train or both, the position of other trains and also the time at which the trains pass given points, whereby the location of any train may be known and the time at which each reached any particular point, thus making collisions next to impossible.

With these ends in view, this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction in detail, referring by letter to the accompanying drawings forming a part of this specification, in which—

Figure 1 is a diagrammatical view of two railways crossing each other, showing semaphores upon each side of the crossing, and a motor upon one line. Fig. 2, a diagram of a portion of a railway illustrating a side track and the switches therefor, and showing a semaphore, revolving lights and also the mechanism to be connected with said semaphore and lights, for actuating the same and for sounding the whistle. Fig. 3, a diagram of a portion of a railway having a third rail arranged adjacent thereto, a diagram of the train motor generator and its local circuits and a view of the registering mechanism, and a diagram of the local circuits connected therewith.

In carrying out my invention as here embodied, A and B represent two railway lines crossing each other, and C and D are the third rails arranged adjacent to these lines. These third rails are arranged in sections broken at given points along the lines as indicated at a' and b' , which sections may be of any desired length, say, every one fourth mile, and a semaphore may be located at the

end of each of these sections as indicated at E, E', E² and E³.

At a crossing such as shown in Fig. 1 the third rail C bridges the crossing by the wire d' and is connected with the semaphore E² by the wire e' and with the semaphore E³ by the wire f' , while the third rail D bridges the crossing by the wire g' and is connected with the semaphore E by the wire h' and the semaphore E' by the wire i' , each semaphore being connected with one of the rails of the track.

The semaphores are constructed as follows: H is an ordinary post to which is pivoted the swinging arm I connected by the rod J with the lever J' and the spring J², and this spring normally holds the semaphore in a lowered position shown in Fig. 2. K represents a motor, power for which is supplied through the wires L which form a part of the circuit made by the movements of the train from one section of the track to another, and this motor carries the pinion K' which meshes with the rack bar K², the lower end of the latter being connected with the lever J' so that when the motor is revolved in the direction of the arrow marked thereon the arm I of the semaphore will be raised as will be readily understood. M is a gear wheel also meshing with the pinion K' and having attached thereto the connecting rod M' which operates the air pump M² for forcing air through the pipe M³ into the cylinder M⁴; to this cylinder is attached the whistle M⁵ adapted to be operated by the lever M⁶ the outer end of the latter being connected with the link M⁷, in the slot of which is fitted the pin N carried by the gear wheel N', the latter meshing with a pinion upon the same shaft with the gear wheel M'. The result of this arrangement is that when the motor is put in operation from the train the semaphore arm I is raised, air is pumped into the cylinder M⁴ and a half revolution of the gear wheel N' will open and close the whistle so as to cause it to be sounded for a given length of time and then shut off.

In order that the sight signal may be made more prominent and thus avoid the possibility of the engineer passing the same without observing it I arrange two or more arms O upon the horizontal shaft O' and attach electric lights indicated at O² to the outer ends of these arms so that when this shaft O' is revolved these lights will swing across the track, giving the appearance of the light

being waved by an attendant; this shaft O' is revolved by the motor K through a bevel gear O^3 meshing with a corresponding gear upon the same shaft with the pinion K' , thus when the motor K is put into operation the lights O^2 will be swung to and fro across the track.

The diagram of the railway track and switch in Fig. 2 illustrates the manner in which the semaphore and its attendant mechanism will be put into operation when the main line is closed by the switch, the side track being open. In this diagram P represents a contact block at each end of the bridge wire P' , and P^2 is a contact block carried by the switch block and connected by the wire P^3 with the third rail C , this arrangement being the same at each end of the side track. Thus when the switch is in the position shown in Fig. 2 the main track being open and free for the passage of the train, the block P^2 is out of contact with the block P and consequently no current passes to the motor over the wire L , but should the switch be thrown so as to close the main line and open the side track for the passage of the train thereon, this movement of the switch lever will also carry the block P^2 into contact with the block P thus completing the circuit between the track rail and third rail, causing the motor to operate and bring about the movements described, namely, the raising of the semaphore arm I , the sounding of the whistle and the swinging of the lights O^2 across the track.

On each train motor, at local stations, such as switch towers, or at a central station, such as a train despatcher's office, or at all of these may be placed a recording mechanism for determining the location and time at which the train reached a particular location, and the construction and arrangement of this mechanism is as follows:—it being understood that a direct current generator Q is located upon the train motors and the terminals thereof connected one with the rails of the track through the wheels of the motor, and the other to the third rail C through an ordinary traveling shoe A^2 . At each point where the indicating mechanism is located a wire S leads from the third rail and a wire S' leads back to the track rail, and these wires lead to and from the electromagnet S^2 which actuates the armature S^3 carried by the lever S^4 , the outer end of which serves as a pawl to revolve the ratchet wheel S^5 step by step, and this ratchet wheel carries with it the pointer T . The dial in front of which the pointer T moves consists of two metallic bands W and W' , the former having raised ribs thereon representing the stations or other desired localities along the line, while the band W' also has raised ribs representing the blocks or sections of the third rail. The band W is connected by the wire W^2 with the

magnet W^3 and also by a proper wire with the battery W^4 which battery is connected by the wire W^5 with the pointer T , thus forming a local circuit in which the magnet W^3 is included, and as the pointer comes in contact with the raised ribs of the band W the circuit will be closed and the magnet W^3 vitalized, causing it to drag its armature thereby depressing the swinging pin W^6 which will make an impression in any suitable disk revolved by the clock mechanism W^7 , thus showing the time at which the hand passes any given rib, and these ribs, as before stated, represent stations along the line at which the current of the generator will be thrown to line thereby operating these registering mechanisms wherever included in the circuit and indicating the time at which the train passes any particular station. The band W' is electrically connected with the magnet X by the wire X' and is also included in the circuit with the battery W^4 and the pointer T so that when the pointer T or the brush carried thereby contacts with the ribs upon the band W' the swinging pin X^2 will be depressed making an impression upon any suitable card carried by the clock mechanism X^3 . This will indicate the time at which the train passes each of the sections in the third rail.

As a means of attracting attention to the fact that the register is being made, a local circuit a leads from the battery W^4 to the lever S^4 and back again, and has included therein the lamp b so that if further upward movement of the lever continues it will make contact with the point c thus closing this local circuit and causing the lamp b to flash.

d represents a resistance coil included in the circuit leading from the train motor to the third rail, and from the further side of this coil a local circuit e is run back to the generator, in which is included the electromagnet f and a lamp g , and so long as no current is opposed to the current of this generator a current will flow through the local circuit e causing the lamp g to burn, and at the same time vitalize the magnet f holding its armature h in contact with the poles of said magnet, but when a counter current is thrown to line opposing the current from the generator Q , the voltage will be neutralized, and no current will pass through the coil d nor through the local circuit e , thus causing the armature h to drop down and close the branch i of the local circuit, in which is located the lamp j preferably red. This will extinguish the lamp g and light the lamp j , due to the fact that the coil d has sufficient resistance to prevent the neutralizing of the current from the generator Q in the local circuit on the near side of the coil. Alternate trains running in the same directions are to throw currents of opposite polarity to line so that when two trains moving in the

same direction come upon the same section the current from both generators will be neutralized, and the lamp *g* extinguished and the lamp *j* lighted in both train motors.

5 *k* represents a lamp bridging on wires S and S' so that so long as but one train is in a block to which this circuit is connected the lamp *k* will burn, but should a second train enter this block the neutralizing of the current by the operation of the two generators as before described will extinguish the lamp *k*, thus notifying the station as well as the two train motors that a second train has entered this block. This neutralizing of the circuit in which the two trains will then be included will enable the station to communicate with either or both of the trains by telephone or telegraph, the instruments of which would of course be connected in the circuit.

In order that the station may be able to signal a train to stop a generator I may be located in the station in the circuit with the wires S and S', and by means of a switch *m* the circuit may be closed so as to neutralize the current on the main line, thus lighting the lamp *j* in the train motor, thereby notifying the driver that his train must come to a stop, after which the station may communicate with the driver by the proper manipulation of the switch *m*, so as to produce flashes of the lamp *j* corresponding to a predetermined code, or these communications may be had by telephone. Should one of these registering mechanisms be located upon the motor of each train traveling upon a road equipped with my system, and another be also located at a central station, such as a train dispatcher's office, the driver of each train when coming within a certain distance of another train moving in either direction the registering mechanism under his observation will indicate where the other train is located, and at what time it reached either the station or block, likewise the train dispatcher will have accurate record of the position of each train and also know the time at which they pass any particular station or block.

50 Having thus fully described my invention, what I claim as new and useful, is—

1. The herein described combination of a railway track, one of the rails of which forms a part of an electric circuit, a third rail electrically broken in sections, a traveling motor adapted to run upon the track, a shoe carried by said motor adapted to run upon the third rail, an electric generator carried by the motor, semaphores located at suitable points along the railway, mechanism connecting each semaphore and included in the circuit with the generator, said mechanism being adapted to operate the semaphore from electric currents from the generator, and recording mechanisms also included in the circuit

in which the generator is included, said recording mechanism adapted to register the location and time at which a train reaches or passes a given location, as specified.

2. In a block signal system, the combination with two railway tracks crossing each other, one rail of each track forming a part of an electric circuit, a third rail electrically broken in sections arranged beside each track, bridge wires connecting the broken sections of the third rails at the crossing, a semaphore located on each side of the crossing on each track, wires connecting the third rail of each track with three of the semaphores, a shoe carried by the traveling motor, said shoe adapted to travel upon the third rail, and a generator carried by the traveling motor for transmitting current to the line to operate the mechanisms of the semaphores, as specified.

3. In combination with a system of the character described, a semaphore, means for normally holding the swinging arm of the semaphore in a lowered position, a motor, wires for including said motor in the circuit of a traveling generator, an air compressor connected with the motor, a tank for receiving compressed air, a whistle connected with the tank, means connected with the motor for opening and closing the whistle, and means also connected with the motor for elevating the swinging arm of the semaphore, as specified.

4. In combination with a system of the character described, a semaphore, means for normally holding the swinging arm of the semaphore in a lowered position, a motor, wires for including said motor in the circuit of a traveling generator, an air compressor connected with the motor, a tank for receiving compressed air, a whistle connected with the tank, means connected with the motor for opening and closing the whistle, means also connected with the motor for elevating the swinging arm of the semaphore, revolving arms, lights carried upon said arms, and means connected with the motor for revolving these lights across the railway, as specified.

5. In combination with a system of the character described, a semaphore, means for normally holding the swinging arm of the semaphore in a lowered position, a motor, wires for including said motor in the circuit of a traveling generator, an air compressor connected with the motor, a tank for receiving compressed air, a whistle connected with the tank, means connected with the motor for opening and closing the whistle, means also connected with the motor for elevating the swinging arm of the semaphore, revolving arms, lights carried upon said arms, means connected with the motor for revolving these lights across the railway, and a contact block carried by the railway switch for opening the circuit, electrically connecting

the motor with the traveling generator, as specified.

6. In a system of the character described, the combination of a railway track, one rail of which forms a part of an electric circuit, a third rail electrically broken in sections, said sections forming a part of said circuit, a generator located upon a train motor, means for including said generator in the circuit and a recording mechanism also included in the circuit, said recording mechanism adapted to record the number of sections passed by the train and the time at which each section is passed, as specified.

7. In a system of the character described, the combination of a railway track, one rail of which forms a part of an electric circuit, a third rail electrically broken in sections, said sections forming a part of said circuit, a generator located upon a train motor, means for including said generator in the circuit, a recording mechanism also included in the circuit, said recording mechanism adapted to record the number of sections passed by the train and the time at which each section is passed, and means such as a generator located at the recording station for neutraliz-

ing the current in the circuit whereby a signal is given upon the train motor, as specified.

8. In a system of the character described, the combination of a railway track, one rail of which forms a part of an electric circuit, a third rail electrically broken in sections, said sections forming a part of said circuit, a generator located upon a train motor, means for including said generator in the circuit, a recording mechanism also included in the circuit, said recording mechanism adapted to record the number of sections passed by the train and the time at which each section is passed, means such as a generator located at the recording station for neutralizing the current in the circuit whereby a signal is given upon the train motor and means for communicating with the driver of the motor, as specified.

In testimony whereof, I have hereunto affixed my signature in the presence of two subscribing witnesses.

JAMES P. NORWOOD.

Witnesses:

S. M. GALLAGHER,
E. N. SCHOFIELD.